

**REMARKS**

The Office Action mailed July 13, 2006, and made final, has been carefully reviewed and the following remarks are made in consequence thereof.

Claims 1, 3-15, 17-29 are now pending in this application. Claims 1-29 stand rejected. Claims 2 and 16 have been canceled.

The rejection of Claims 1-29 under 35 U.S.C. §112, first paragraph is respectfully traversed. Claims 1 and 15 have been amended to address the issue raised by the Examiner in the Office Action. For the reasons set forth above, Applicants respectfully request that the Section 112 rejection of Claims 1-29 be withdrawn.

The rejection of Claims 1, 2, 5-9, 12-16, 19-23, 28, and 29 under 35 U.S.C. § 103(a) as being unpatentable over Bidaud (U.S. Pat. No. 6,347,265) in view of Ford (U.S. Pat. No. 6,211,821) is respectfully traversed.

Bidaud describes a track analyzer included on a vehicle (28) traveling on a track (10) that includes a vertical gyroscope (20) for determining a grade and an elevation of the track. A rate gyroscope (50) determines a curvature of the track. A speed determiner (70) determines a speed of the vehicle relative to the track. A distance determiner (91) determines a distance the vehicle has traveled along the track. Also, the direction in which the vehicle is moving, meaning forward or backward, is determined by whether the phase of a first plate (112) leads/lags the phase of a second plate (114). Notably, Bidaud does not describe nor suggest determining a heading and/or pitch using a vector distance  $\vec{d}$  between the two antennas.

Ford describes a heading (multipath) sensor (70) including a primary receiver (45) which is configured to receive a positioning signal (51) from a primary antenna (41). The heading sensor also includes a secondary receiver (47) configured to receive a positioning signal (53) from a secondary antenna (43). Both receivers send an output (57 and 59) to a computational unit (60), respectively. The heading sensor uses differences in carrier observations made at the primary antenna and the secondary antenna to generate a baseline vector (49) and produce five double difference observations. Notably, Ford does not describe

nor suggest using a vector distance  $\vec{d}$  between the two antennas to determine pitch and/or heading.

Claim 1 recites a method for determining at least one of motion and location parameters of a railroad locomotive, with the locomotive oriented with either end thereof in the lead in the direction of travel of the locomotive, wherein the method comprises “providing at least two satellite signal receivers on the locomotive at spaced locations along the length of the locomotive . . . determining a set of phase differences between satellite reference signals received by satellite receivers . . . determining an accurate heading, accurate heading rate, attitude, and attitude rate of the locomotive during normal locomotive transit operation using the set of phase differences between the satellite reference signals, wherein the locomotive is self-propelled or propelled in a consist with other locomotives, and wherein the attitude and the attitude rate are determined using a vector distance  $\vec{d}$  between the two antennas.”

Neither Bidaud nor Ford, considered alone or in combination, describe nor suggest a method for determining at least one of motion and location parameters of a railroad locomotive, as is recited in Claim 1. Specifically, neither Bidaud nor Ford, considered alone or in combination, describe nor suggest, determining an attitude and an attitude rate using a vector distance  $\vec{d}$  between two antennas. Rather, in contrast to the present invention, Bidaud describes a track analyzer that uses a gyroscope to determine a grade and an elevation of a track, a curvature of the track, a speed of a vehicle relative to the track, a distance the vehicle has traveled along the track, and the direction in which the vehicle is moving, and Ford describes a system that utilizes multipath error estimates to determine a heading. Accordingly, Applicants submit that Claim 1 is patentable over Bidaud and Ford.

Claim 2 had been canceled. Claims 5-9, and 12-14 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 5-9, and 12-14 are considered in combination with the recitations of Claim 1, Applicants submit that Claims 5-9, and 12-14 likewise are patentable over Bidaud in view of Ford.

Claim 15 recites an apparatus for determining at least one of motion and location parameters of a railroad locomotive to detect curves and reduce track wear, with the locomotive oriented with either end of the locomotive in the lead in the direction of travel of

the locomotive, wherein the apparatus comprises “at least two phase-locking satellite receivers configured to reference signals received from a set of satellites . . . a processor configured to determine a set of phase differences between the reference signals received by said satellite receivers and an accurate heading, accurate heading rate, attitude, and attitude rate of the locomotive during normal locomotive transit operation using the set of phase differences between the reference signals, and wherein the attitude and the attitude rate are determined using a vector distance  $\vec{d}$  between the two antennas.”

Neither Bidaud nor Ford, considered alone or in combination, describe nor suggest an apparatus for determining at least one of motion and location parameters of a railroad locomotive to detect curves and reduce track wear, as is recited in Claim 15. Specifically, neither Bidaud nor Ford, considered alone or in combination, describe nor suggest an apparatus that determines an attitude and an attitude rate using a vector distance  $\vec{d}$  between the two antennas. Rather, in contrast to the present invention, Bidaud describes a track analyzer that uses a gyroscope to determine a grade and an elevation of a track, a curvature of the track, a speed of a vehicle relative to the track, a distance the vehicle has traveled along the track, and the direction in which the vehicle is moving, and Ford describes a system that utilizes multipath error estimates to determine a heading. Accordingly, Applicants submit that Claim 15 is patentable over Bidaud and Ford.

Claim 16 has been canceled. Claims 19-23, 28, and 29 depend, directly or indirectly, from independent Claim 15. When the recitations of Claims 19-23, 28, and 29 are considered in combination with the recitations of Claim 15, Applicants submit that Claims 19-23, 28, and 29 likewise are patentable over Bidaud in view of Ford.

For at least the reasons set forth above, Applicants respectfully requests that the Section 103 rejection of Claims 1, 2, 5-9, 12-16, 19-23, 28, and 29 be withdrawn.

The rejection of Claims 3, 4, 17, and 18 under 35 U.S.C. § 103(a) as being unpatentable over Bidaud in view of Ford as applied to Claims 1, 2, 15, and 16 above, and further in view of Wilson (U.S. Pat. No. 6,313,788) is respectfully traversed.

Bidaud and Ford are described above. Wilson describes a method for determining inter-antenna baselines using an antenna configuration (200) including a pair of relatively closely spaced (D1) antennas and other pairs of distant (D2) antennas. The closely spaced

pair provides a short baseline having an integer ambiguity that may be searched exhaustively to identify the correct set of integers. The short baseline is used to aid in determining longer baselines, that once determined, may be used for accurate run time attitude determination. Notably, in contrast to the Examiners assertion on pages 4 and 5 of the Office Action, Wilson does not describe nor suggest using the baseline vector to determine pitch and/or heading. Specifically, the Examiner asserts that “Wilson disclose using the equations in the claims to determine  $\vec{d}$ .” However, claims 4 and 16 do not describe equations for determining  $\vec{d}$ , as asserted by the Examiner. Rather, former Claims 4 and 16 recite equations that use vector  $\vec{d}$  to determine a heading and a pitch. As stated above, Wilson does not describe these equations, nor does Wilson describe any equations for determining heading and pitch. Specifically, Wilson does not describe nor suggest using vector  $\vec{d}$  to determine heading or pitch. Rather, the equations described in Wilson are used to determine baselines and integer ambiguities between a plurality of antennas.

Claim 1 recites a method for determining at least one of motion and location parameters of a railroad locomotive, with the locomotive oriented with either end thereof in the lead in the direction of travel of the locomotive, wherein the method comprises “providing at least two satellite signal receivers on the locomotive at spaced locations along the length of the locomotive . . . determining a set of phase differences between satellite reference signals received by satellite receivers . . . determining an accurate heading, accurate heading rate, attitude, and attitude rate of the locomotive during normal locomotive transit operation using the set of phase differences between the satellite reference signals, wherein the locomotive is self-propelled or propelled in a consist with other locomotives, and wherein the attitude and the attitude rate are determined using a vector distance  $\vec{d}$  between the two antennas.”

No combination of Bidaud, Ford, and Wilson, describes or suggests a method for determining at least one of motion and location parameters of a railroad locomotive, as is recited in Claim 1. Specifically, no combination of Bidaud, Ford, and Wilson, describes or suggests determining an attitude and an attitude rate using a vector distance  $\vec{d}$  between the two antennas. Rather, in contrast to the present invention, Bidaud describes a track analyzer that uses a gyroscope to determine a grade and an elevation of a track, a curvature of the

track, a speed of a vehicle relative to the track, a distance the vehicle has traveled along the track, and the direction in which the vehicle is moving, Ford describes a system that utilizes multipath error estimates to determine a heading, and Wilson describes equations used to determine baselines and integer ambiguities between a plurality of antennas. Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Bidaud in view of Ford and Wilson.

Claims 3 and 4 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 3 and 4 are considered in combination with the recitations of Claim 1, Applicants submit that Claims 3 and 4 likewise are patentable over Bidaud in view of Ford and Wilson.

Claim 15 recites an apparatus for determining at least one of motion and location parameters of a railroad locomotive to detect curves and reduce track wear, with the locomotive oriented with either end of the locomotive in the lead in the direction of travel of the locomotive, wherein the apparatus comprises “at least two phase-locking satellite receivers configured to reference signals received from a set of satellites . . . a processor configured to determine a set of phase differences between the reference signals received by said satellite receivers and an accurate heading, accurate heading rate, attitude, and attitude rate of the locomotive during normal locomotive transit operation using the set of phase differences between the reference signals, and wherein the attitude and the attitude rate are determined using a vector distance  $\vec{d}$  between the two antennas.”

No combination of Bidaud, Ford, and Wilson, describes or suggests an apparatus for determining at least one of motion and location parameters of a railroad locomotive to detect curves and reduce track wear, as is recited in Claim 15. Specifically, no combination of Bidaud, Ford, and Wilson, describes or suggests an apparatus that determines an attitude and an attitude rate using a vector distance  $\vec{d}$  between the two antennas. Rather, in contrast to the present invention, Bidaud describes a track analyzer that uses a gyroscope to determine a grade and an elevation of a track, a curvature of the track, a speed of a vehicle relative to the track, a distance the vehicle has traveled along the track, and the direction in which the vehicle is moving, Ford describes a system that utilizes multipath error estimates to determine a heading, and Wilson describes equations used to determine baselines and integer

ambiguities between a plurality of antennas. Accordingly, for at least the reasons set forth above, Claim 15 is submitted to be patentable over Bidaud in view of Ford and Wilson.

Claims 17 and 18 depend, directly or indirectly, from independent Claim 15. When the recitations of Claims 17 and 18 are considered in combination with the recitations of Claim 15, Applicants submit that Claims 17 and 18 likewise are patentable over Bidaud in view of Ford and Wilson.

For at least the reasons set forth above, Applicants respectfully requests that the Section 103 rejection of Claims 3, 4, 17, and 18 be withdrawn.

The rejection of Claims 10, 11, and 24-27 under 35 U.S.C. § 103(a) as being unpatentable over Bidaud in view of Ford as applied to Claims 1, 5, 15, and 19 above, and further in view of Kumar (U.S. Pat. No. 5,896,947) is respectfully traversed.

Bidaud and Ford are described above. Kumar describes a method for simultaneously lubricating the rail gage side (RAGS) and wheel flanges ahead of a locomotive's (1) tractive wheels and lubricating the top of the rail (TOR) behind the tractive wheels to reduce the resistance of the trailing cars and reduce the locomotive wheel flange wear. The method includes controlling both lubricating units with the same computer controller (2) when a single locomotive (1) is used and two controllers (2F, 2R) located in two different locomotives (1) in the case of a train consist (10). Notably, Kumar does not describe nor suggest using a vector distance  $\vec{d}$  between two antennas to determine pitch and/or heading.

Claim 1 recites a method for determining at least one of motion and location parameters of a railroad locomotive, with the locomotive oriented with either end thereof in the lead in the direction of travel of the locomotive, wherein the method comprises "providing at least two satellite signal receivers on the locomotive at spaced locations along the length of the locomotive . . . determining a set of phase differences between satellite reference signals received by satellite receivers . . . determining an accurate heading, accurate heading rate, attitude, and attitude rate of the locomotive during normal locomotive transit operation using the set of phase differences between the satellite reference signals, wherein the locomotive is self-propelled or propelled in a consist with other locomotives, and wherein the attitude and the attitude rate are determined using a vector distance  $\vec{d}$  between the two antennas."

No combination of Bidaud, Ford, and Kumar, describes or suggests a method for determining at least one of motion and location parameters of a railroad locomotive, as is recited in Claim 1. Specifically, no combination of Bidaud, Ford, and Kumar, describes or suggests a method for determining an attitude and an attitude rate using a vector distance  $\vec{d}$  between the two antennas. Rather, in contrast to the present invention, Bidaud describes a track analyzer that uses a gyroscope to determine a grade and an elevation of a track, a curvature of the track, a speed of a vehicle relative to the track, a distance the vehicle has traveled along the track, and the direction in which the vehicle is moving, Ford describes a system that utilizes multipath error estimates to determine a heading, and Kumar describes a method for simultaneously lubricating the rail gage side (RAGS) and wheel flanges ahead of a locomotive's tractive wheels and lubricating the top of the rail (TOR) behind the locomotive's tractive wheels. Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Bidaud in view of Ford and Kumar.

Claims 10 and 11 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 10 and 11 are considered in combination with the recitations of Claim 1, Applicants submit that Claims 10 and 11 likewise are patentable over Bidaud in view of Ford and Kumar.

Claim 15 recites an apparatus for determining at least one of motion and location parameters of a railroad locomotive to detect curves and reduce track wear, with the locomotive oriented with either end of the locomotive in the lead in the direction of travel of the locomotive, wherein the apparatus comprises "at least two phase-locking satellite receivers configured to reference signals received from a set of satellites . . . a processor configured to determine a set of phase differences between the reference signals received by said satellite receivers and an accurate heading, accurate heading rate, attitude, and attitude rate of the locomotive during normal locomotive transit operation using the set of phase differences between the reference signals, and wherein the attitude and the attitude rate are determined using a vector distance  $\vec{d}$  between the two antennas."

No combination of Bidaud, Ford, and Kumar describes or suggests an apparatus for determining at least one of motion and location parameters of a railroad locomotive to detect curves and reduce track wear, as is recited in Claim 15. Specifically, no combination of Bidaud, Ford, and Kumar, describes or suggests an apparatus that determines an attitude and

an attitude rate using a vector distance  $\vec{d}$  between the two antennas. Rather, in contrast to the present invention, Bidaud describes a track analyzer that uses a gyroscope to determine a grade and an elevation of a track, a curvature of the track, a speed of a vehicle relative to the track, a distance the vehicle has traveled along the track, and the direction in which the vehicle is moving, Ford describes a system that utilizes multipath error estimates to determine a heading, and Kumar describes a method for simultaneously lubricating the rail gage side (RAGS) and wheel flanges ahead of a locomotive's tractive wheels and lubricating the top of the rail (TOR) behind the locomotive's tractive wheels. Accordingly, for at least the reasons set forth above, Claim 15 is submitted to be patentable over Bidaud in view of Ford and Kumar.

Claims 24-27 depend, directly or indirectly, from independent Claim 15. When the recitations of Claims 24-27 are considered in combination with the recitations of Claim 15, Applicants submit that Claims 24-27 likewise are patentable over Bidaud in view of Ford and Kumar.

For at least the reasons set forth above, Applicants respectfully requests that the Section 103 rejection of Claims 10, 11, and 24-27 be withdrawn.

Moreover, Applicants respectfully submit that the Section 103 rejections of the presently pending claims are not proper rejections. As is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. None of Bidaud, Ford, Wilson, or Kumar, considered alone or in combination, describe or suggest the claimed combinations. Furthermore, in contrast to the assertions within the Office Action, Applicants respectfully submit that it would not be obvious to one skilled in the art to combine any of Bidaud, Ford, Wilson, or Kumar because there is no motivation to combine the references suggested in the art. Additionally, the Examiner has not pointed to any prior art that teaches or suggests to combine the disclosures, other than Applicants' own teaching.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine

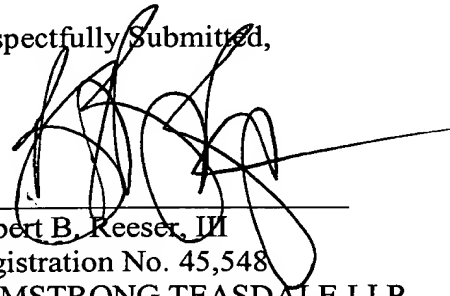


such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejection is based on a combination of teachings selected in an attempt to arrive at the claimed invention. Since there is no teaching nor suggestion in the cited art for the combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for these reasons, along with the reasons given above, Applicants request that the Section 103 rejections of the Claims be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



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